

WHAT IS CLAIMED IS:

1. A fuel cell stack comprising a plurality of planar interleaved fuel cells and interconnects comprising a contact layer disposed between at least one electrode of a
5 fuel cell and an adjacent interconnect, the contact layer comprising a perovskite having the formula ABO_3 where:
 - (a) A is a doped or undoped rare earth metal or lanthanide;
 - (b) B is a doped or undoped transition metal; and
 - 10 (c) wherein the perovskite is electrically conductive and has a coefficient of thermal expansion which closely matches that of the fuel cell.
2. The fuel cell stack of claim 1 wherein A comprises doped or undoped lanthanum.
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3. The fuel cell stack of claim 2 wherein B comprises cobalt combined with nickel as follows: $\text{Co}_{1-y}\text{Ni}_y$ where $0.3 \leq y \leq 0.7$.
4. The fuel cell stack of claim 3 wherein the perovskite material comprises $\text{La}_{1-x}\text{E}_x\text{Co}_{0.6}\text{Ni}_{0.4}\text{O}_3$, where E is an alkaline earth metal and x is greater than or equal to zero.
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5. The fuel cell stack of claim 1, 2, 3 or 4 wherein at least one dopant is a sintering aid.
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6. The fuel cell stack of claim 1 wherein the electrode comprises a noble metal and yttria stabilized zirconia.
7. The fuel cell stack of claim 6 wherein the noble metal comprises palladium.
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8. A fuel cell stack comprising a plurality of planar interleaved fuel cells and interconnects and comprising a contact layer disposed between at least one electrode of a fuel cell and an adjacent interconnect, the contact layer comprising at least two outer layers and a central layer of electrically conductive materials, wherein the
5 central layer comprises a stress relief layer comprised of material selected from the group consisting of:

- 10 (a) particles of a conductive ceramic material which are coarser than in the outer layers;
- (b) particles of a conductive ceramic material which has significantly different sintering characteristics than the outer layers; and
- 15 (c) a porous metallic material.

16 9. The fuel cell stack of claim 8 wherein the stress-relief layer comprises coarse particles and the outer layers comprises fine particles.

17 10. The fuel cell stack of claim 9 wherein the coarse particles have an average
20 diameter at least about twice as large as the average diameter of the fine particles.

18 11. The fuel cell stack of claim 10 wherein the outer layers comprises particles
19 having an average diameter of less than about 2 µm and the central layer comprises
20 particles having a diameter of greater than about 2 µm.

21 12. The fuel cell stack of claim 9 wherein the central layer comprises LCN
22 particles.

23 13. The fuel cell stack of claim 12 wherein the outer layers comprise LC
24 particles.

14. The fuel cell stack of claim 8 wherein the outer layers comprise fine LC or LCN particles and the stress relief layer comprises fine LSM particles, or coarse LSM particles, or coarse LCN particles.

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15. The fuel cell stack of claim 14 wherein a first outer layer contacting the electrode comprises fine LCN particles, a second outer layer contacting the interconnect comprises fine LC particles, and the stress relief layer comprises coarse LCN particles.

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